



Sprout Building
Green Design Today

101-111 Gerrard St. East, Toronto

Office Building

Ryerson University



AGENDA

PROJECT OVERVIEW

Site analysis, design goals
and constraints

01

ARCHITECTURE

Floorplan, design, and
occupant comfort & IEQ

02

ENGINEERING

Structure, enclosure, and
mechanical

03

ENERGY PERFORMANCE

Energy modelling

04

COSTS AND SAVINGS

Project cost and savings
analysis

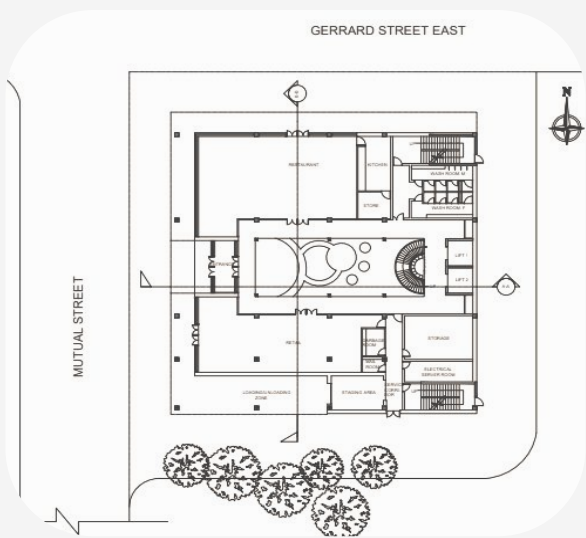
05

LIFE CYCLE ASSESSMENT

Life Cycle Assessment
results

06





01 Project Overview

Location: 101-111 Gerrard Street East, Toronto, ON

Site Owner: Ryerson University

Climate Zone: ASHRAE 5A

Lot Size: 13251.94 ft² (1231 m²)

Building Size: 70,683 ft² (6566.67 m²)

Occupancy: 320 people (220 ft² per person)

Projected Costs: \$304.86USD/ft² (\$380.66 CAD/ft²)



Project Goals



NET-ZERO ENERGY



FOSTER SOCIAL INTERACTIONS



PROMOTE CIRCULARITY



RESILIENT AND DURABLE



AESTHETICALLY PLEASING



INSPIRING



Project Constraints



CLIMATE

Cold climate that requires
high-performance
enclosures



AIR QUALITY

Pollutants in a busy
downtown area pose
health risks



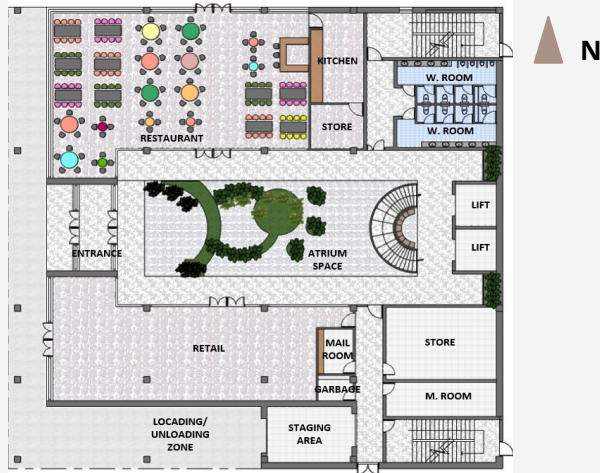
SITE LIMITATIONS

Limited solar potential.

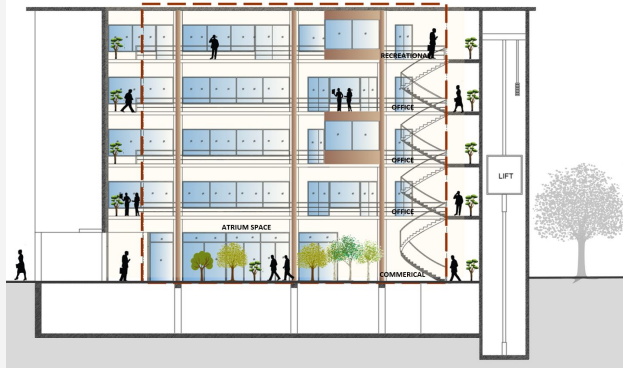


02 Architecture



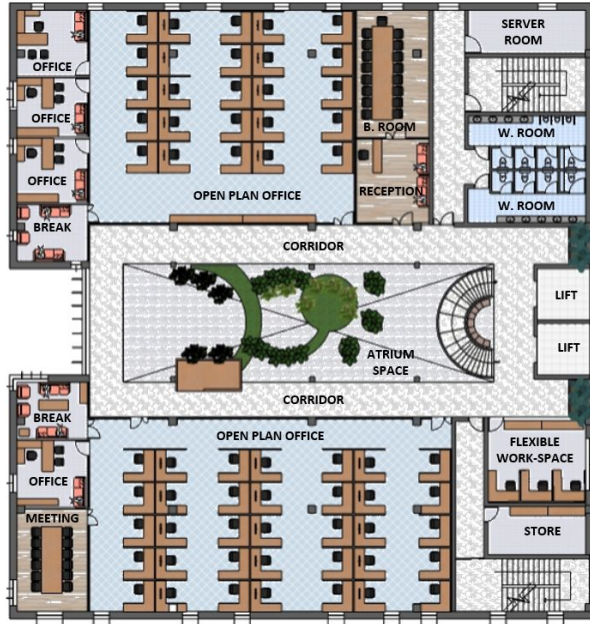


Retail Space



1st floor layout & zoning





2nd, 3rd, 4th floor layout



The Atrium





5th floor recreational layout



The Green Roof



Occupant Comfort & IEQ



Promote physical activity



Foster physical and mental health



Ensure healthy indoor air quality



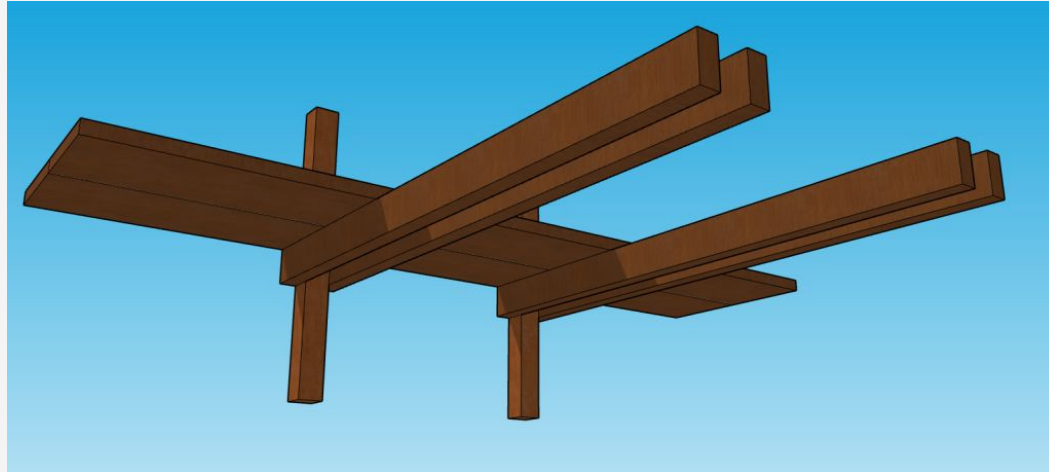
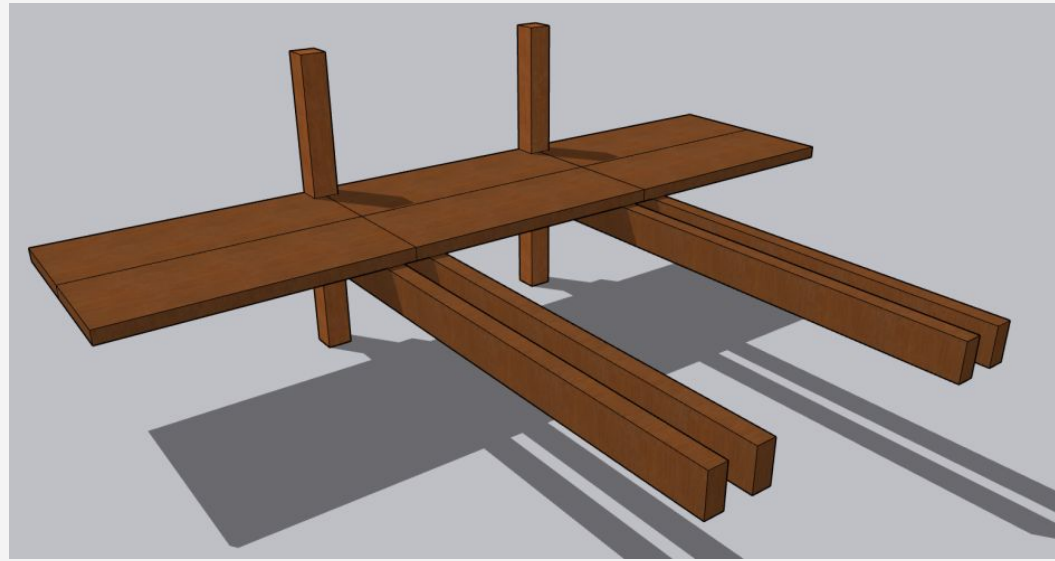
03 Engineering



Structure

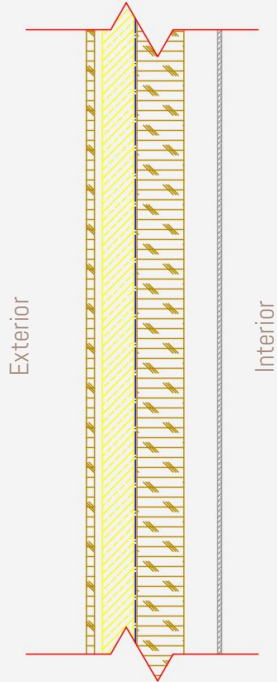
Mass Timber

- Lower embodied carbon
- Structurally sound
- Largely prefabricated
- Faster onsite construction
- CLT panels and Glulam beams

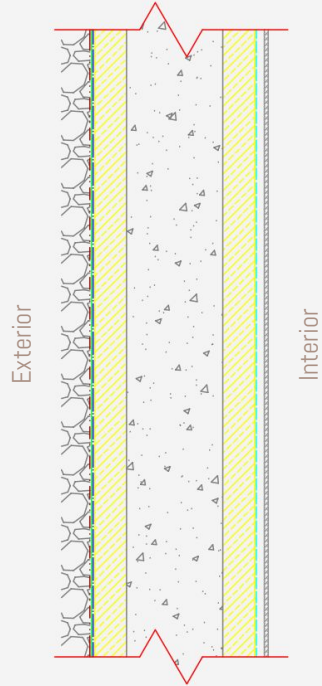


Enclosure

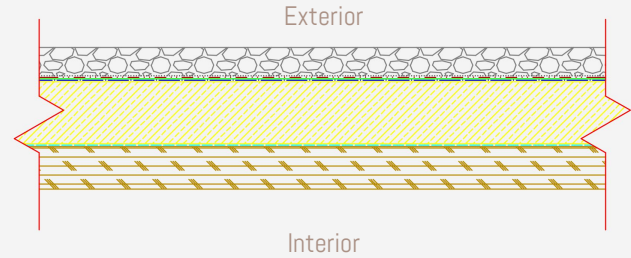
Opaque Wall - R38



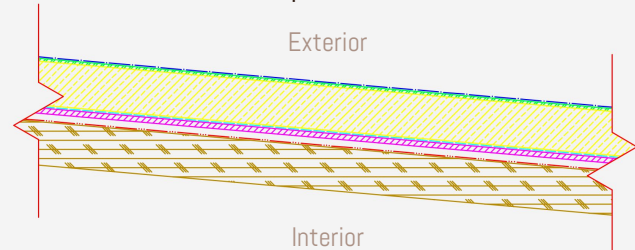
Below-Grade Wall - R40



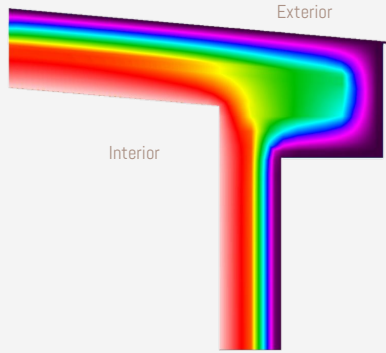
Green Roof - R53



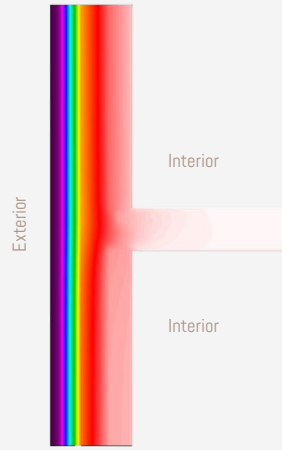
Low-Slope Roof - R52



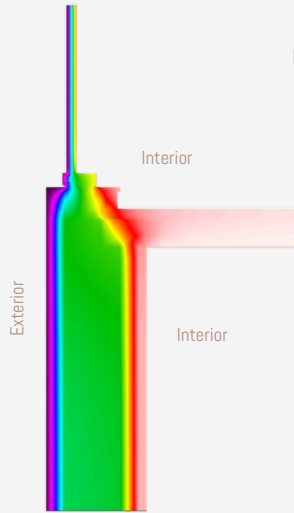
Enclosure



Roof-Opaque Wall
 $\Psi=0.121 \text{ W/mK}$



Opaque wall-floor
 $\Psi=0.038 \text{ W/mK}$



Curtain-wall Footer
 $\Psi=0.301 \text{ W/mK}$



CLT Total water content over 3 years



Mechanical Engineering

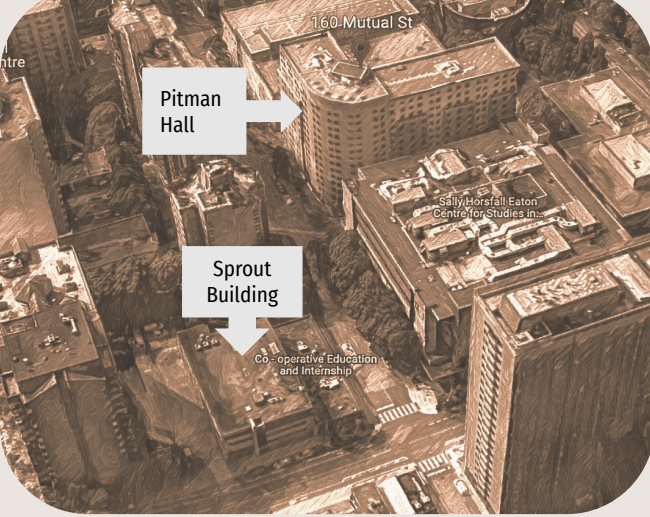
Heating and Cooling:

VRF and Geothermal with
Ground Source Heat Pump

Ventilation:

DOAS with ERV



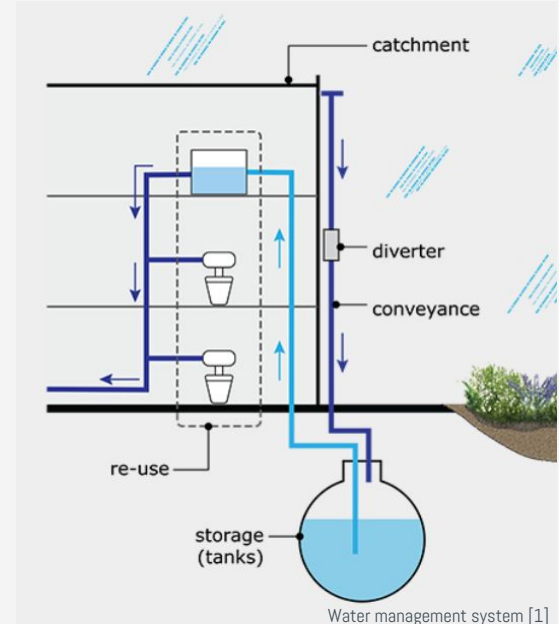


Photovoltaic System

- Electricity Demand: 463,331 kWh/year
- Produced Onsite: 295,358 kWh/year
- Produced on Pitman Hall building: 490,560 kWh/year
- Total Electricity Produced: 785,918 kWh/year

Water Management

- Building-Level Metering
- Rainwater Harvesting
- High-Efficiency Water Fixtures: (7% reduction)
- Water-Efficient Toilets: (6% reduction)



Water management system [1]

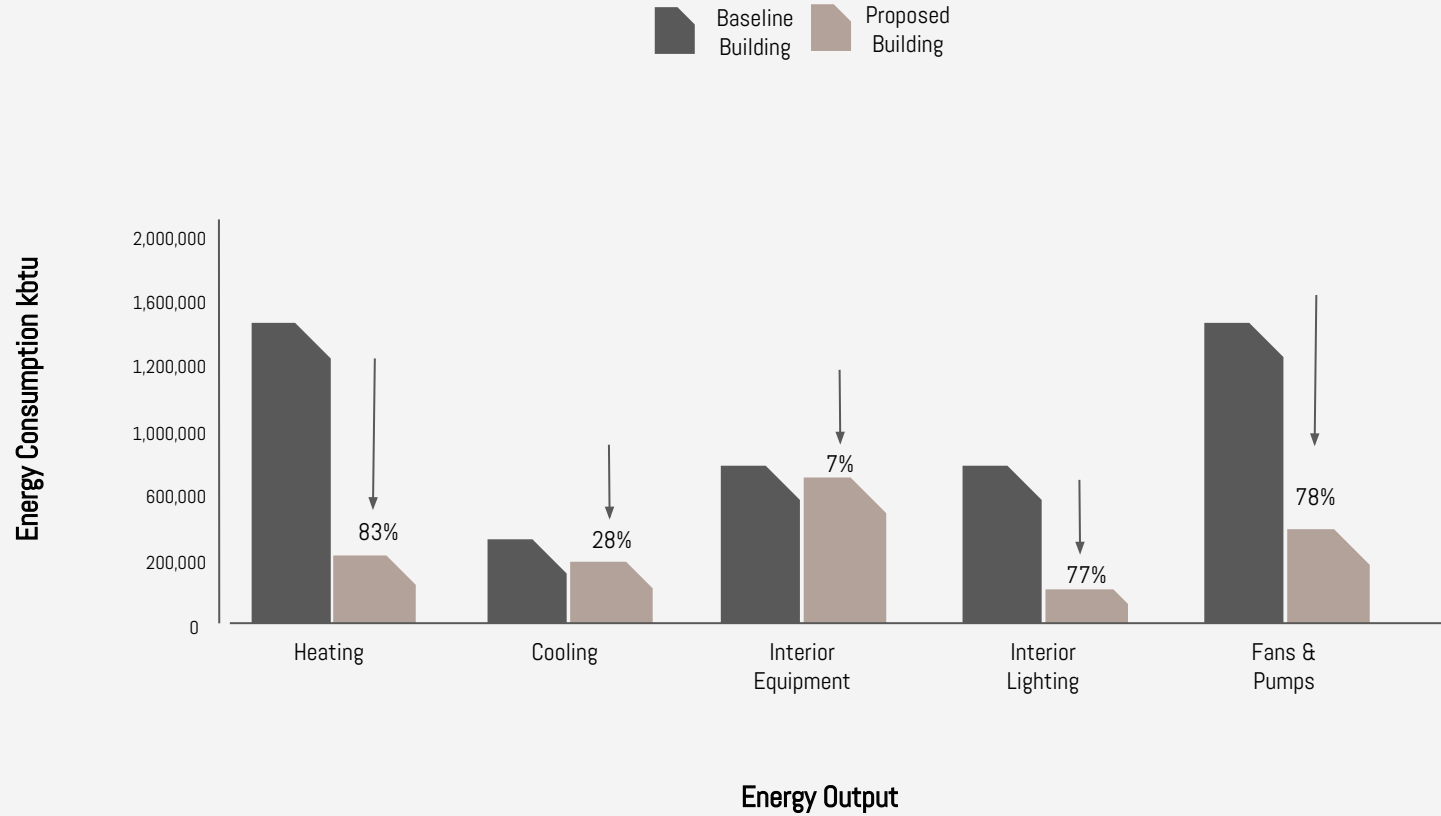


04 Energy Performance

Project EUI:
25.67 KBtu/ft²

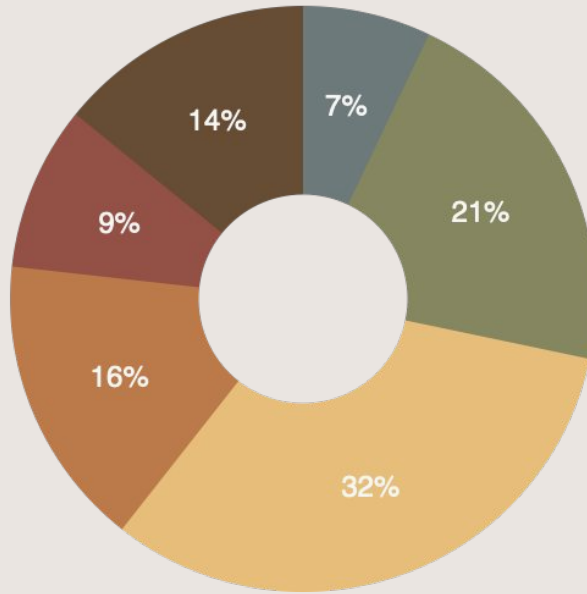


Energy Performance Results



05 Cost Analysis

● Site ● Structure ● Enclosure ● Mechanical ● Finishes ● GC



Total Project Cost

\$21,315,043.60 USD

\$304.86 USD

Per ft²



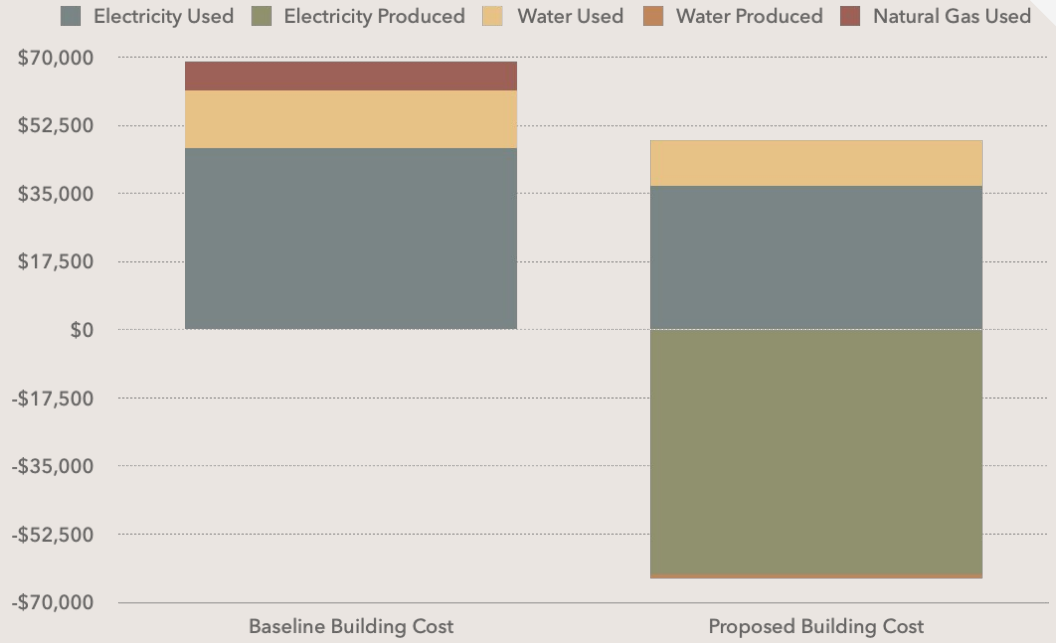
Annual Savings



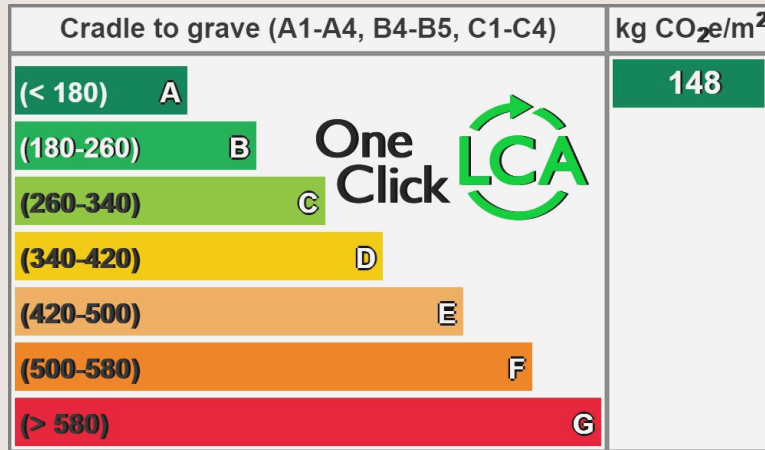
\$66,640

Total Annual
Operational
Savings

Operational Costs of Baseline Building vs. Proposed Building



06 Life Cycle Assessment



Total Emissions

3,397

T CO₂e

Emissions Intensity

30.32

lb CO₂e

Per ft²

148 Kg CO₂e / m²



The Team

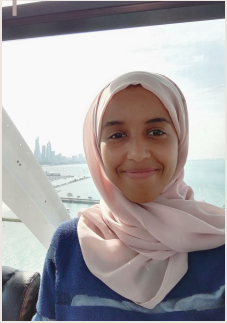


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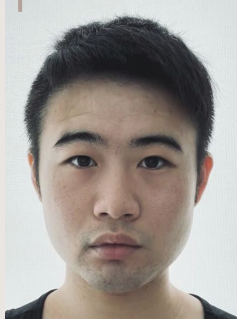
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YANGCHAO LI



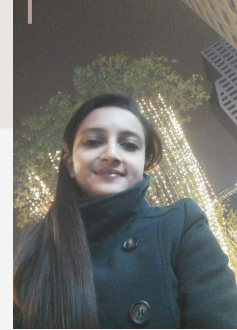
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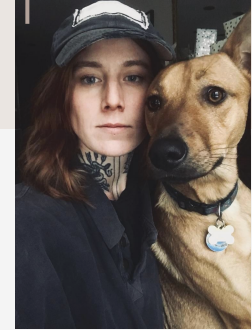
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THANK YOU

Any questions?

Ryerson University

Sprout Building Team



References

[1] Rain water harvesting. (n.d.). NEXT.cc. Retrieved from <https://www.next.cc/journey/design/rain-water-harvesting>